

C7 REPLACEMENT MANUAL
C7X2 and C7X2C
For DYNACO
Stereo 120
SCA-80(Q)
Stereo 80



C7X2 above (one of two shown)



C7X2C above (one of two shown)

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Section 1: About This Manual

This manual covers the replacement of both the stock C7 output (speaker) coupling capacitors. There are two kits available to replace these caps:

- C7X2, a configuration of Dynamite capacitors in a 2" OD plastic sleeve
- C7X2C, a 2" diameter 10,000 μ F 100 volt capacitor

It applies to these Dynaco products:

- Stereo 120 Power Amplifier with original amplifier modules
- Stereo 80 Power Amplifier with original or updated amplifier modules
- SCA-80 and SCA-80Q Integrated Amplifiers with original or updated amplifier modules.

In the Stereo 120, the original C7 capacitor was 3300 μ F. The upgrade for C7 is a triple of three 3300 μ F capacitors in parallel, for a total capacitance of 9900 μ F. This extends the low frequency response and reduces low frequency distortion. The C7X2C upgrade to 10,000 μ F is essentially the same, just in a different package.

In the Stereo 80, SCA-80, and SCA-80Q the original C7 capacitor was 5000 μ F. The upgrade kit almost doubles the original C7 capacitance for these units.

There are two cases where installing the C7 is valuable:

1. If the original (40+ year old caps) have lost capacitance, which can make for either tinny sound or no sound.
2. Even if the original caps are good, increasing the C7 value reduces low frequency distortion and allows a bit more power to be delivered to your speakers.

Who Should Attempt this Project?

You can build this kit and improve your Dynaco Stereo 120 if you can:

1. solder (using normal rosin core solder and a soldering iron).
2. use simple hand tools like screwdrivers, wire cutters, and pliers.
3. make basic voltmeter measurements
4. read and follow directions.

It helps if you:

1. know a bit about electronics, or
2. have a friend who knows a bit about electronics

Tools You'll Need

You'll need the following tools to update your Stereo 120:

1. flat blade screwdriver for #6 screws, #2 Phillips screw driver
2. pliers or nut drivers suitable for #6 hardware (5/16" nut driver or hex wrench)
3. needle nose pliers
4. pencil type soldering iron of 25 to 50 Watts (no huge honking soldering guns or blowtorches)
5. wire cutters and strippers

Project Overview

The project replaces C7, the speaker coupling capacitor, for both the left and right channels. We assume that your original amplifier modules were working, with the biggest problem being that the old C7 has lost a significant amount of its capacitance.

Alternatively, you may choose to install this C7 upgrade to improve the bass and reduce the low frequency distortion of your Stereo 120, Stereo 80, or SCA-80. The major steps are:

1. Removing the old C7's and their mounting clamps.
2. Building the new triple capacitor modules in the original mounting clamps.
3. Re-using the old inductor wire from the original C7
4. Re-installing the new C7's.
5. Testing the completed result and reassembling the amplifier.

Important Safety Notes

By purchasing this kit, you have agreed to hold Akitika, LLC harmless for any injuries you may receive in its assembly and/or use. To prevent injuries:

- Wear safety glasses when soldering to prevent eye injuries.
- Always unplug the power before working on the amplifier.
- Large capacitors hold lots of energy for a long time. Before you put your hands into the amplifier:
 - Pull the AC plug!
 - Wait 1 full minute for the capacitors to discharge!
- Remove jewelry and rings from your hands and wrists, or anything that might dangle into the amplifier. Remove loose objects from your shirt-pockets that might fall into the amplifier.
- If working in the amplifier, keep one hand in your pocket, especially if you're near the power supply or power supply wires. This can prevent serious shocks.
- Build with a buddy nearby. If you've ignored all the previous advice, they can dial 911 or get you to the hospital.

Section 2: Preliminaries

Overview

Interestingly, Dynaco called the speaker coupling (output) capacitor C7 in all three products (Stereo 120, Stereo 80, and SCA-80(Q)).

- For the C7X2 kit, you will replace the old C7 with a new C7 composed of three smaller caps wired in parallel for a total of 9900 μF . In the process of replacing the caps, the geometry of the output inductor is changed. To compensate, you will re-wind the output inductor, reducing the number of turns. As a side benefit, this increases the damping factor of the amplifier and provides a more linear output inductor.
- For the C7X2C kit, you will replace the old C7 with a new 2" diameter 10,000 μF 100 Volt capacitor. The geometry of the output inductor is retained.

We give the most detailed instructions for the Stereo 120. Please read that section, no matter which Dynaco kit you have. That will make the somewhat less detailed instructions for the other amps make sense.

Does Your Stereo-120, Stereo-80, or SCA-80(Q) Work?

The C7 kits are meant to be installed into otherwise working equipment. If your equipment is broken (more than just a bad C7), then you should definitely repair it first. Doing otherwise invites bad outcomes unless you are very knowledgeable.

Opening the Stereo 120

1. ***Make sure the amplifier is unplugged. If it was recently powered allow the amp to sit for one full minute before proceeding.***
2. Remove the four screws along the outside edge of the bottom that hold the cover in place (see Figure 1).
3. Holding both the top and bottom of the amplifier, flip it over.
4. Lift the perforated metal top off of the amplifier.

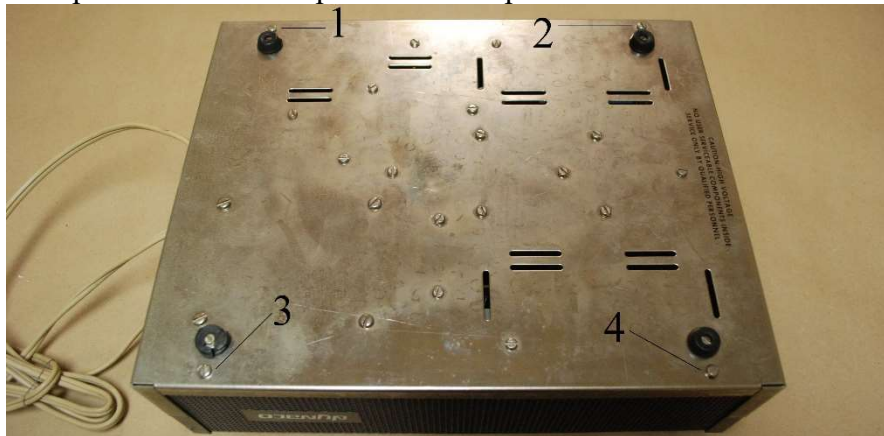


Figure 1-Location of the four screws that hold the cover to the base

Removing Left and Right Channel C7's

The following procedure applies to both the left and right channel C7's. Refer to Figure 2.

1. Left channel – the left channel capacitor C7 is near the end of the chassis.
 - a. Make and apply a masking tape label with “L+” for the wire that goes from the left channel PC-14 Eyelet 8 to the positive (red) capacitor terminal.
 - b. Desolder the wire from the positive capacitor terminal.
 - c. Make and apply a masking tape label with “L-” for the wire that goes from the left channel PC-14 Eyelet 11 to the negative (black) capacitor terminal.
 - d. Desolder the wire from the negative capacitor terminal.
 - e. Identify the white wire from the coil around C7 that connects to the left channel red speaker binding post. Desolder it from the binding post.
2. Right channel – the right channel capacitor C7 is near the center of the chassis.

- a. Make and apply a masking tape label with “R+” for the wire that goes from the right channel PC-14 Eyelet 8 to the positive (red) capacitor terminal.
 - b. Desolder the wire from the positive capacitor terminal.
 - c. Make and apply a masking tape label with “R-” for the wire that goes from the right channel PC-14 Eyelet 11 to the negative (black) capacitor terminal.
 - d. Desolder the wire from the negative capacitor terminal.
 - e. Identify the white wire from the coil around C7 that connects to the right channel red speaker binding post. Desolder it from the binding post.
3. Remove the three screws that hold the capacitor clamp to the chassis. Save the screws for re-assembly. The kit provides 6 keps nuts (nuts with attached lock washers) to make reassembly easier. Don't loosen the capacitor clamp screw yet.

Make sure that the 0.1 μ F capacitors remain attached to the red speaker binding posts!

Opening the Stereo 80

1. *Make sure the amplifier is unplugged. If it was recently powered allow the amp to sit for one full minute before proceeding.*
2. Remove the four screws along the outside edge of the bottom that hold the cover in place/
3. Holding both the top and bottom of the amplifier, flip it over.
4. Lift the perforated metal top from the amplifier.

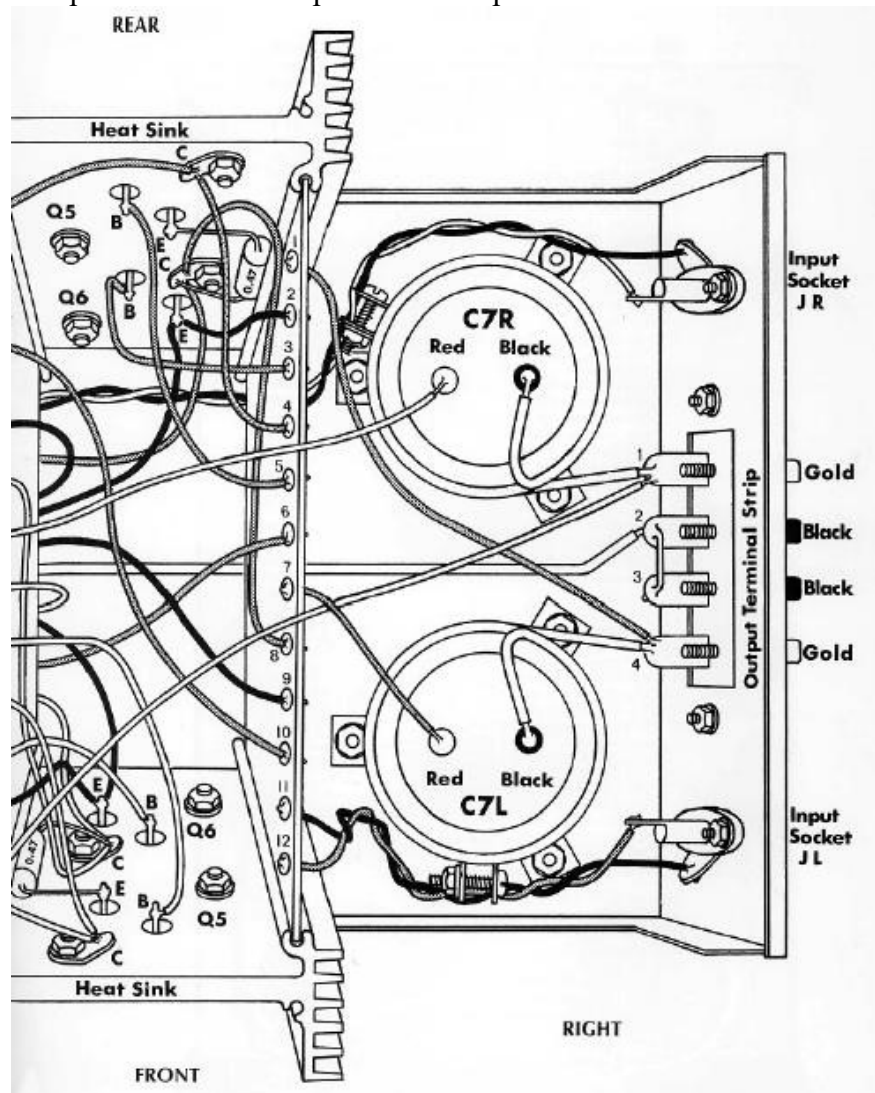


Figure 3-C7 Location in the Stereo 80

Removing Left and Right Channel C7's

The following procedure applies to both the left and right channel C7's. Refer to Figure 3.

Left channel

- a. Make and apply a masking tape label with "L+" to the wire that connects to the positive (red) capacitor terminal.
- b. Desolder the wire from the positive capacitor terminal.

- c. Desolder from both ends the wire that connects the black terminal of C7L to terminal 4 of the Output Terminal Strip.
 4. Right channel – the right channel capacitor C7 is near the center of the chassis.
 - a. Make and apply a masking tape label with “R+” to the wire that connects to the positive (red) capacitor terminal.
 - b. Desolder the wire from the positive capacitor terminal.
 - c. Desolder from both ends the wire that connects the black terminal of C7R to terminal 1 of the Output Terminal Strip.

For both C7's, left and right:

1. Remove the three screws that hold the capacitor clamp to the chassis. Save the screws for re-assembly. The kit provides 6 keps nuts (nuts with attached lockwashers) to make reassembly easier. Don't loosen the capacitor clamp screw yet.

Opening the SCA80 or SCA80Q

1. *Make sure the amplifier is unplugged. If it was recently powered allow the amp to sit for one full minute before proceeding.*
2. Remove four screws, two along the left edge and two along the right edge of the cover.
3. Remove the screw in the center of the back panel that fastens the cover to the chassis.
4. Lift the perforated metal top from the amplifier.

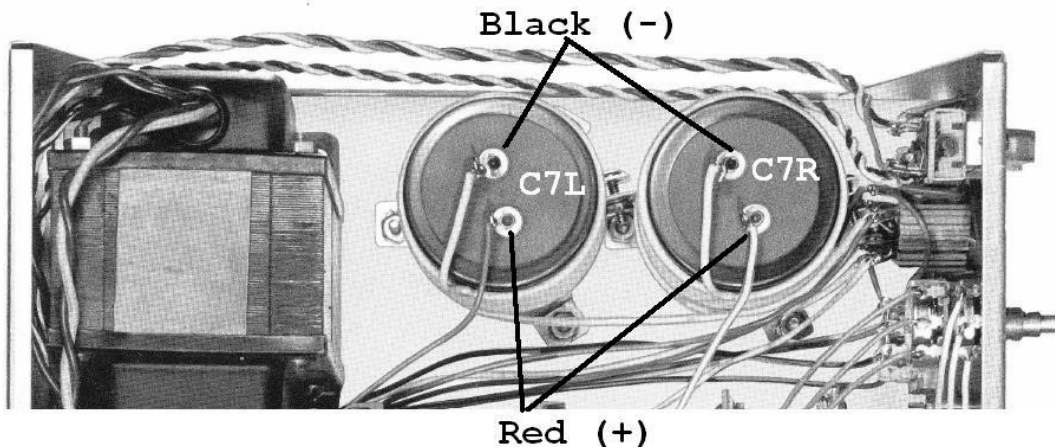


Figure 4-C7 Location for SCA80(Q)

Removing Left and Right Channel C7's

The following procedure applies to both the left and right channel C7's. Refer to Figure 4.

1. Left channel
 - a. Make and apply a masking tape label with “L+” to the wire that connects to the positive (red) capacitor terminal.
 - b. Desolder the wire from the positive capacitor terminal.
 - c. Desolder the wire that connects to the black terminal of C7L.
2. Right channel

- a. Make and apply a masking tape label with “R+” to the wire that connects to the positive (red) capacitor terminal.
- b. Desolder the wire from the positive capacitor terminal.
- c. Desolder the wire that connects to the black terminal of C7R.

For both C7’s, left and right:

2. Remove the three screws that hold the capacitor clamp to the chassis. Save the screws for re-assembly. The kit provides 6 keps nuts (nuts with attached lockwashers) to make reassembly easier. Don’t loosen the capacitor clamp screw yet.

Building the Dynamite Capacitors – C7X2 kit

This section covers the C7X2 kit. For the C7X2C kit, please refer to the section, “Installing the C7X2C kit”. The actions described in this section must be performed twice, once for the left channel, and then again for the right channel.

1. You’ll replace C7, a single 2” diameter capacitor with three smaller capacitors that fit beautifully inside a polycarbonate tube with 2” outer diameter, as shown in Figure 5.
2. Loosen the capacitor clamp screw and remove the original C7.



Figure 5-3 capacitors take the space of one 2” diameter capacitor

3. As received, the three caps have the negative leads in the center of the grouping. They have been glued into the polycarbonate ring with a special adhesive. The capacitor and polycarbonate ring combination drop nicely into the existing clamps. Place the group of three capacitors in the clamp as shown in Figure 5. Tighten the capacitor clamp screw. Use either the original screw, or the supplied 5/8” screw if it fits better.
4. Cut two 2” lengths of the supplied 18 or 20 AWG red wire. Remove 3/8” of insulation from the ends. Connect together the positive capacitor terminals as shown in Figure 6



Figure 6-Connecting the positive terminals together

5. Remove and straighten the white wire that was wrapped around the old C7. It will be reused (though not all of it) to create the new inductor for the new C7.
6. Strip a bit more than 2” of insulation from the white wire. Clean the bare wire by lightly scraping it with the jaws of the diagonal cutters or by cleaning it with isopropyl alcohol. This step is not strictly necessary, but it may make the wire a bit easier to solder.
7. Form the bare wire as shown to connect together all three negative terminals as shown in Figure 7.

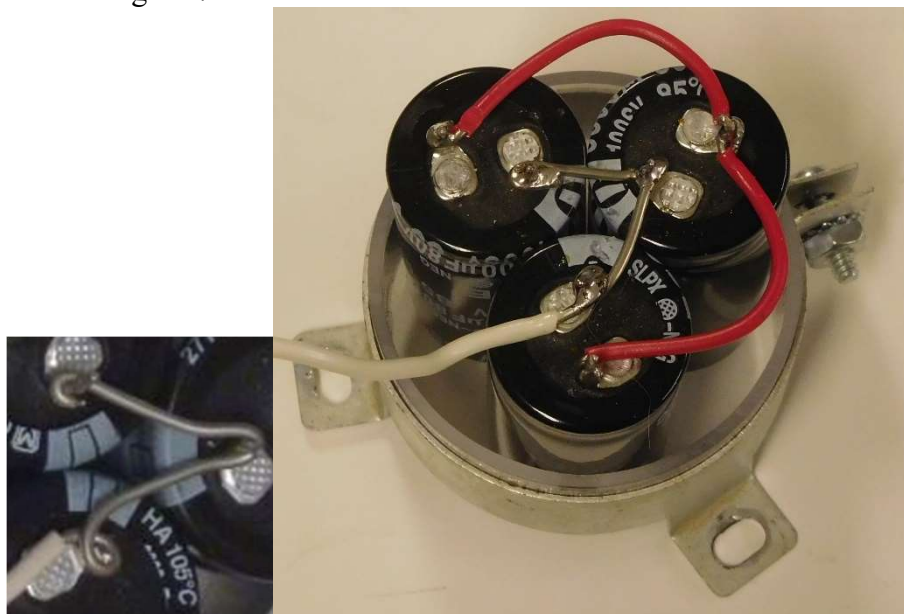


Figure 7-Adding the recycled white wire from the old cap to the negative terminals of the new triple cap

8. . Solder the terminals.

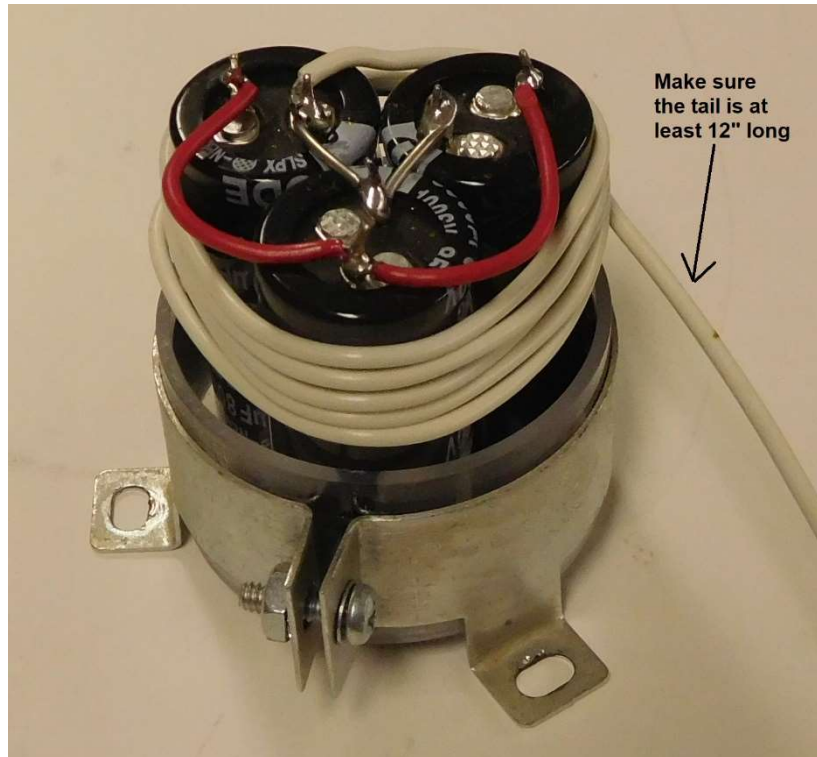


Figure 8-Adding the coil

9. Wrap 5¹ turns of wire around the top of the capacitors, as shown in Figure 8. Wrap the turns tightly, starting the first turn in the ridge near the top of the capacitors. You can add a layer of transparent tape² around the turns once they are in place, but it is not necessary. Leave the end of the wire at least 12" long.



Figure 9-Adding tape to hold the windings (optional)

¹ Six turns of wire is good, too.

² I had packing tape handy when I took this picture. Frankly, it's a bit of overkill. Just some transparent tape around the white windings would work well also.

New C7 Capacitors Mechanical Installation

Left Channel C7

The left channel C7 is closest to the end of the chassis. Install the wired capacitor.

1. Note the clamp position.
2. Note the way the end of the coil is dressed toward the red binding post.
3. Install the indicated screw first. Note that the screw does double duty, holding down the terminal strip and the capacitors. Use the supplied PEM nuts and the old 6-32 screws. The PEM nuts have built-in lock washers³.
4. Install the other two screws, holding them in place with the supplied PEM nuts.

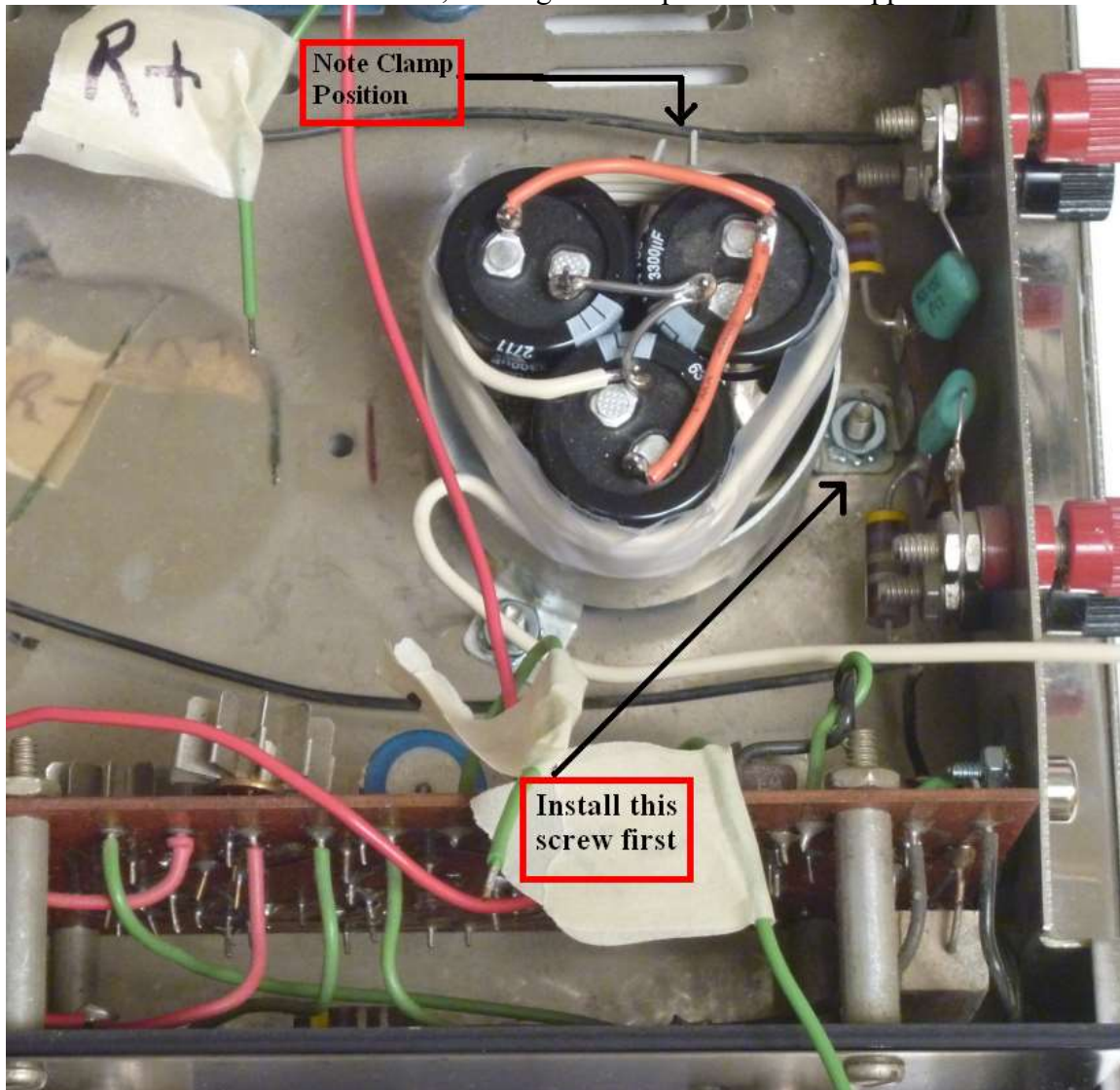


Figure 10-Installing C7 Left Channel

³ The PEM nuts make a difficult assembly a little easier as their lock washers are captive, and so won't fall off the nut at the worst possible instant during the assembly process.

Right Channel C7

Install C7 for the right channel as shown in Figure 11

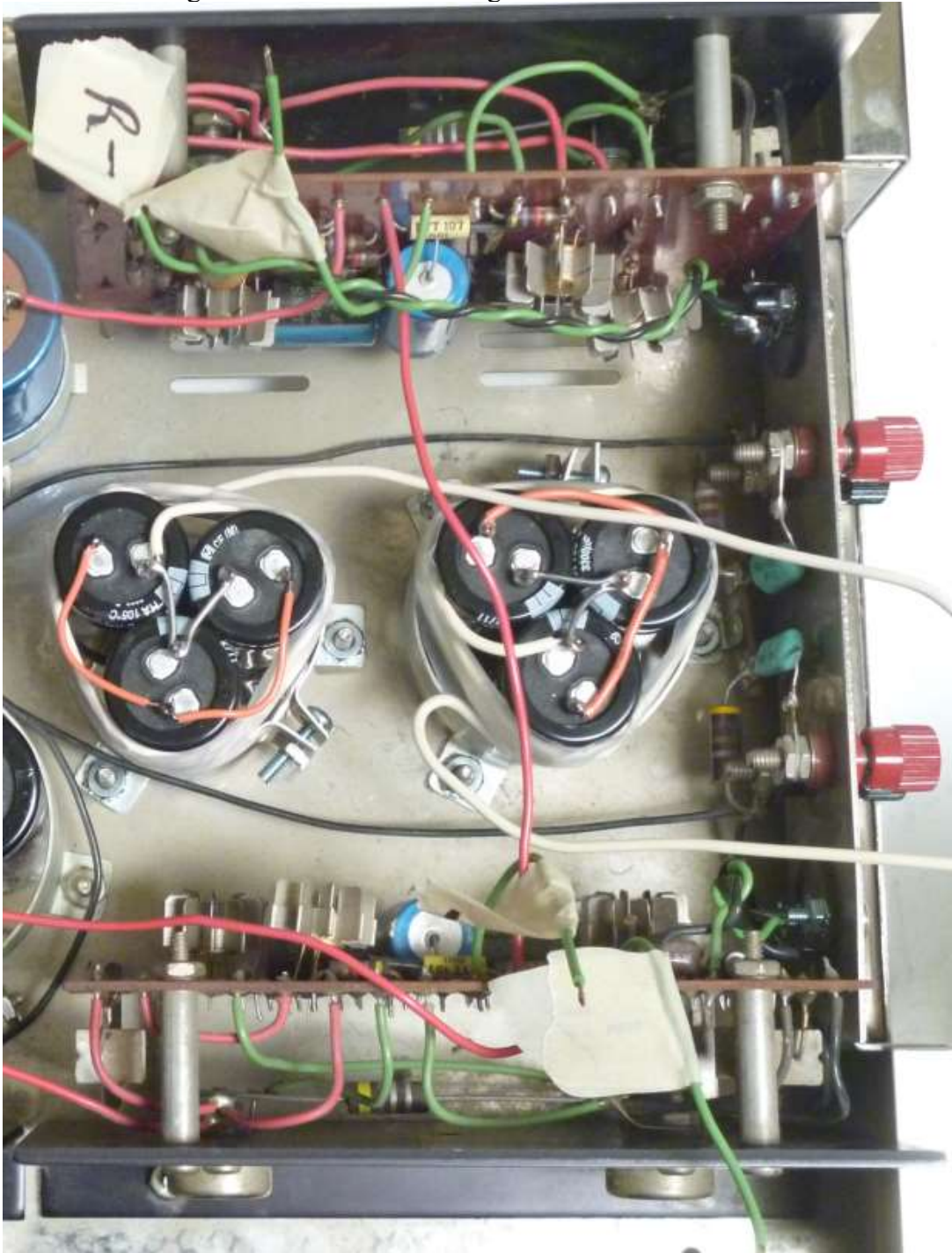


Figure 11-Installing C7 for the right channel

Use the old screws and the new PEM nuts to mount the right channel C7 to the chassis.

1. Match the orientation of the clamp screw.
2. Dress the end of the coil toward the Right channel Red speaker binding post.

New C7 Capacitors Final Wiring

Refer to Figure 13 to see what the completed wiring looks like. Note that the amp shown has standard power supply and amplifier modules, but the stock C12 has been replaced by the C12DD kit⁴.

Left Channel C7

Reconnect the following wires:

1. From the left channel PC-14, eyelet 8, to left channel C7's red wires. If you made masking tape labels, this one will be marked "L+".
2. From the left channel PC-14, eyelet 11, to left channel C7's negative terminal. If you made masking tape labels, this one will be marked "L-".
3. From the end of the coil to the left channel red speaker binding post.

Right Channel C7

Reconnect the following wires:

4. From the right channel PC-14, eyelet 8, to right channel C7's red wires. If you made masking tape labels, this one will be marked "R+".
5. From the right channel PC-14, eyelet 11, to right channel C7's negative terminal. If you made masking tape labels, this one will be marked "R-".
6. From the end of the coil to the right channel red speaker binding post.

Make sure that the 0.1 μ F capacitors remain attached to the red speaker binding posts!

⁴ See the C12 upgrade manual for details. Note that a capacitor on the power supply board must be replaced when C12 is upgraded from 3300 μ F to 20,400 μ F.

Installing the C7X2C kit



Figure 12-Installing C7X2C into a stock SCA80(Q)

The C7X2C kit is much quicker and easier to install:

1. Loosen the screw that holds the capacitor into the clamp.
2. Note the orientation of the positive and negative terminals.
3. De-solder the wires that connect to each terminal.
 - a. Label the wire that connected to the positive terminal.
 - b. Label the wire that connected to the negative terminal.
4. Place 3 pieces of masking tape from top to bottom of the wire coil around the capacitor.
5. Wiggle the coil off the capacitor.
6. Wiggle the capacitor out of the clamp.
7. Remove the screws from the capacitor and install 1 of the supplied lugs onto each of the screws. Re-install the screw-lug combination into the capacitors.
8. Install the new capacitor into the clamp using the same orientation as the original cap. Fit the coil around the new capacitor and settle the combination into the clamp. It is quite likely that to you will not be able to set the bottom of the capacitor on the floor of the chassis. There will still be plenty of room for the capacitor to securely fasten into the clamp.
9. Tighten up the capacitor clamp.
10. Re-attach the positive and negative wires to the corresponding terminals.

Test and Final Assembly

With every securely in place, shake the amplifier out to make sure that there are no loose lock-washers rolling around inside. Make sure that the amplifier is completely disconnected from inputs, speakers, and power. Make sure that the power switch is in the OFF position.

Plug the power cord into the AC mains. Standing to the side of the amplifier, turn on the power switch. There should be the usual soft “bong” from the power transformer at startup, but otherwise there should be no drama.

Please be careful as potentially lethal voltages are now present inside the amplifier.

1. Measure the voltage across C12's terminals to assure that it's within normal limits (72+/-6 Volts).
2. Measure the voltage from each C7 positive terminal to ground (chassis). It should be approximately half of the C12 voltage, plus or minus 3 or 4 volts.
3. You may be alarmed if you measure the voltages across the speaker binding post with no speaker connected. Without a speaker in place the large capacitors charge very slowly. It will take about 5 minutes for the voltage to get below 2 volts. This is normal. With a speaker connected, the voltage across the speaker should drop to under 100 mV in under 10 seconds.
4. Unplug the power cord
5. Wait 3 full minutes to allow the large caps to discharge.
6. Reinstall the perforated metal top, and fasten it in place using the same 4 screws that originally held it in place.

You are ready to listen to music with better bass.

A Compatibility Note

If you install the C7 Kit with a PSUG power supply, you will need to change the value of R22, nominally 165K, to 100K Ohms. This assures that the PSUG will start under all conditions with the large C7 capacitors.

References

Be sure to visit www.updatemydynaco.com to see the latest ways to make your Dynaco Solid State equipment better than new, or to download the latest version of this manual.

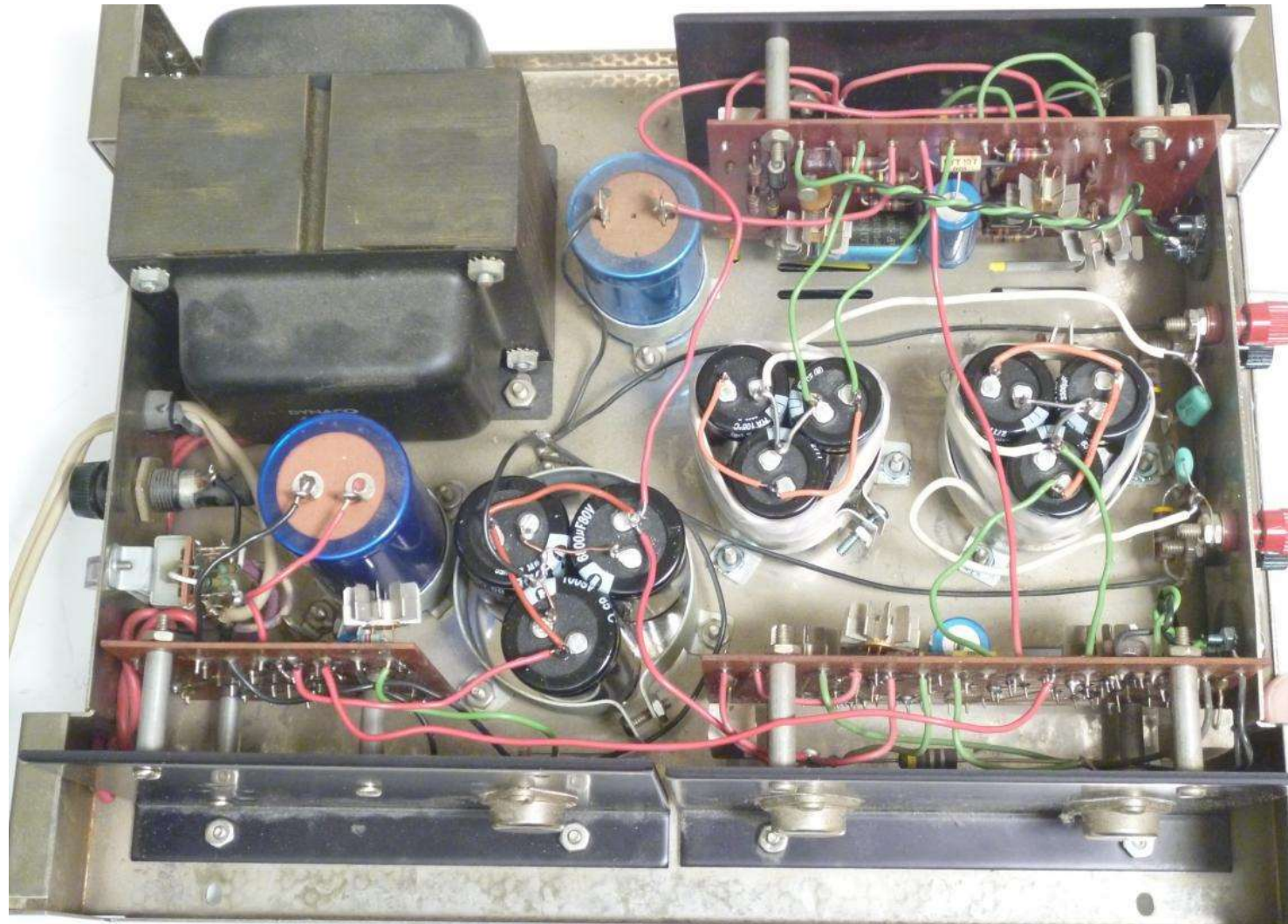
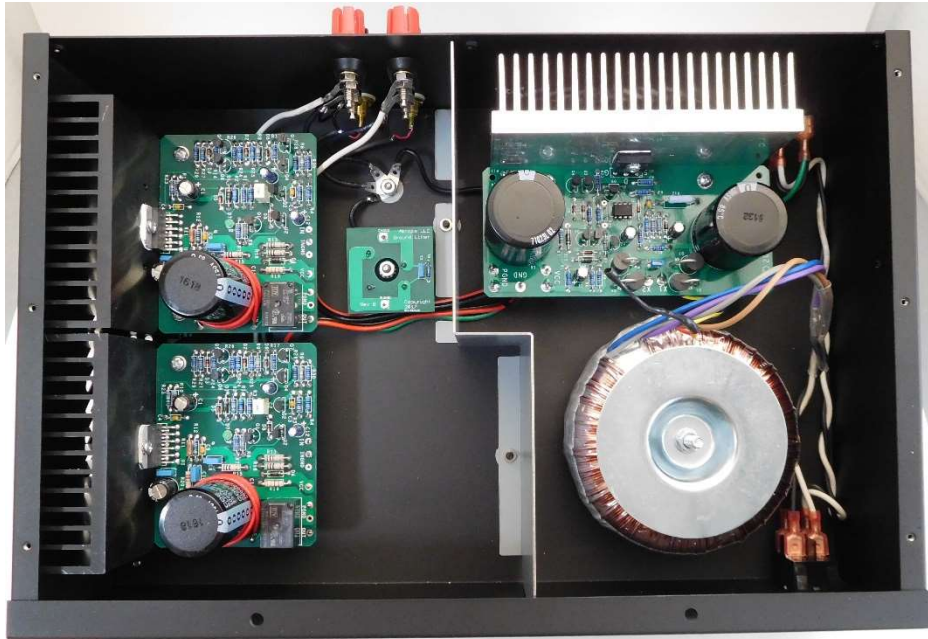


Figure 13-Completed wiring

Better Sound Because You Build It! Akitika's GT-102 Stereo Power Amplifier Kit



Akitika's GT-102 stereo power amplifier kit got a rave review in *Stereophile* magazine. It features the parts quality found in high-end equipment, yet costs just \$314+\$26 shipping in kit form. You can buy it assembled for \$488+\$26 shipping (lower 48 states).

Have you ever built a Heathkit, Eico, or Dynaco kit? Did you build your own computer from components? Was it for the fun? Was it for the feeling of accomplishment? A project to share with the kids or grandkids? Was it to get high-end performance at low cost? If you answered "yes" to any of those questions, the GT-102 kit might be just what you want.

Akitika's GT-102 is a complete stereo power amplifier kit that delivers more than 50 Watts per channel of clean, low noise power into 8 Ohm loads. More measurements can be found at www.akitika.com. The kit supplies everything but the solder. Add a few hours of rewarding assembly time and the result is Better Sound, because you build it.

The kit includes a toroidal power transformer, film and COG capacitors, metal film resistors, heavy-duty extruded aluminum heat sinks, gold-plated and isolated input jacks, double-sided PC boards, and a fully regulated power supply, all elegantly fitted into a black custom chassis. It may well be *the sweetest sound you'll ever build!*